U.S.

SURVEY.

Atascadero Creek above
Pasa Robles, near Templeton

Stop at Cashins Station &
take the road to Schrocder's
Ranch along a small
creek on the banks of which
are fossils about two miles
from Cashins.

Lorenzo Yates
at Santa Barbara

Monterey Cala, Apr. 26-30

The peninsula ending at Pt. Pinos is composed of a coarse by crystalline massive granitic rock which is cut by numerous quartz dykes running in various directions most commonly in a NW and SE general direction. At the surface this rock is much decomposed. At the shore no stratified rocks are exposed though fragments of a clayey mid-cole rock are abundant on the beach. Inland the land rises to a considerable height with no good exposures of the strata owing to the decomposition of the rock but in some places where roads have been made the stratified clay stones can be seen inclined at various

angles but generally over 45 degrees. They are much weathered and decayed and generally broken into rectangular fragments in situ. No fossils were anywhere observed the rocks being greatly contorted and containing many nodules or concretions. On the beach some of the fragments obtained on a visit in 1866 contained miocene bivalves. The contact of the claystones with the granite was not exposed at any of the localities visited.

Salinas Valley.

After leaving Salinas, up to which the country has been sandy or bottom land, the road continues southward mostly on the eastern side of the valley, which is narrow (relatively) and in the middle of which the small stream of the Salinas river meanders over a bed of gravel. The cuts on the east side were into a horizontally stratified fine gravel with occasional coarser layers, and capped with what looked like adobe soil or fine sandy mould; sometimes black and of a considerable depth. The depth of the gravel beds was unexpected. They seem for much of the distance to rise far above the valley plain perhaps even to more than

100 feet above it. The coarser layers (of which one was conspicuous and about two feet thick) are composed of pebbles a part of which appear quite white, as of a weathered clay rock, and the rest of that altered schistose material so common in the Coast ranges. In a few places, coarse decomposed granitic rock resembling that at Monterey shewed itself, and the upper part of several of the hills, as far as could be decided from a distant view, was composed of the crumpled and altered schists. No unaltered stratified rock nor anything resembling fossiliferous beds, was observed along the line.

As the road approaches the head of the valley at the Rancho Santa Margarita the land becomes more rolling

and elevated. In this vicinity in the banks of Atascadero Creek and some of its tributaries Prof. Hilgard has noted fossiliferous beds as elsewhere recorded. As there seemed to be no accommodations attainable and my time altogether is short for the work to be done elsewhere, I did not attempt to remain for the purpose of exploring these beds. At Santa Margarita Station the railway at present ends, and stages carry travellers over the divide to San Luis Obispo. The stage road as it ascends and descends the hills passes many exposures of schistose rock and one or two of what appeared like much contorted and altered sandstones. No fossils were observed. Granitic rock occurs in many places and has been quarried out

to make a supporting wall for the the outer edge of the road.

The town of San Luis Obispo is situated in a recess of the coast range. A creek runs through the center of the town. Along its banks a few exposures occur mostly of greatly crumpled and contorted schists and clayslates; in some places the latter are strongly colored with iron oxide. A fine whitish sandy rock was observed in the form of pebbles but not in place. The hills in the immediate vicinity of the town appeared to be chiefly schistose and rock quarried from them for road metal was of this character with thin laminae of serpentine and some quartzose dyke rock. Decomposed granite was also observed.

Neither in the quarried rock nor in the exposures along the stream nor in the pebbles of its bed were any fossils observed.

In passing along the line of the narrow gauge railway from San Luis Obispo to Port Harford much the same series of rocks as those just described were observed. Toward the sea the sandstones and slaty rocks appear and are more or less contorted and crushed. Inland the schists predominate.

Santa Barbara Cala

Bluff at beach SW of the pier composed of alternate harder and softer layers of indurated mud composed chiefly of fine clay and with some admixture of very fine sand. The harder layers are thoroughly strong the softer ones variable sometimes cutting like cheese under the blade of a pen-knife. They are crammed with remains of polyzoa and small shells especially Bittium and Ashpris, with crushed remains of barnidomus, Chiton and other large shells, sparsely distributed. The bluff rises between 40 and 50 feet from the beach and is inclined 5° to 8° to the south. Many of the shells retain their colors and the age is doubtless Pleistocene. The upper portion of the bluff, perhaps one third is of conformably

stratified yellow sand which near the top becomes mixed with gravel, more brightly colored with iron oxide and finally capped by one or two feet of vegetable mould. Beyond the point where the fossiliferous beds dip into the beach the sand beds become thicker and maintain a height of thirty or forty feet above the beach to Pt Castillo toward which they become indurated forming a solid yellowish sandstone requiring blasting to remove and weathering into bizarre shapes. It is being used in the construction of the seawall intended to protect a driveway along the upper edge of the beach.

This formation seems always to have a bed of pebbles at its base. There are sometimes several beds of gravel with finer material between them but always one.

Los Angeles to San Diego.

The railway east San Luis Rey Pasadena runs along the sea and offers a number of well defined sections. These consist of vertical or nearly vertical bluffs of nearly horizontal strata of sand, gravel and clay slates or limy claystone more or less indurated. The upper portion is always sand or sandstones of yellowish brown tint with a broad layer of gravel above which the sandy strata may be uniform or divided by other gravelly layers, and is surmounted by a thick coating of soil. Below the gravel are sometimes quite massive beds of uniform grayish sandstone with an occasional line of white material indicating an alkaline stratum which effloresces to the weather. Below these are the gray claystones in layers 6" to 1' thick which weather rounded contrasting with the vertical lines

of the sandstones. No fossiliferous layers were noticed in passing.

Point opposite San Diego near Coronado Hotel.

At the S.W. corner under the hotel veranda the spot from which Dr. Stearns collected many Pleistocene fossils in 1887 is now covered in with planking and rip rap to protect the bank from the encroachments of the sea.

A little further south and east the furnaces, gas & electrical works of the Hotel are situated against a bank having a southern exposure on Florida Bay. In the lower part of this bank the fossiliferous stratum exists and is visible, being at this point about 6 inches thick, covered with horizontal thin layers of sand some of which are more muddy than others. The total thickness

of the bank at this point appears to be about 12-14 feet above high water mark).

City Park of San Diego.

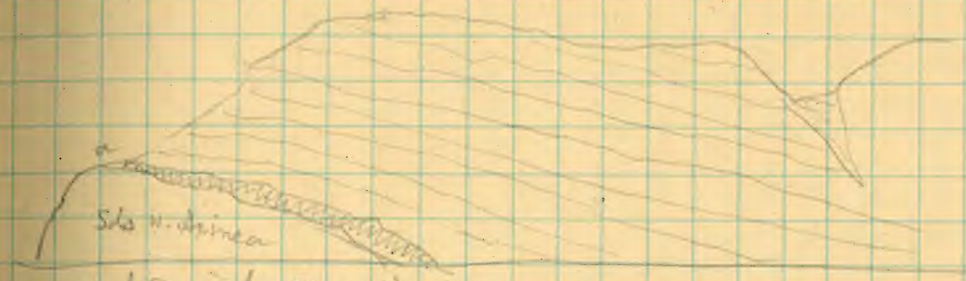
Northward from the "New town" of San Diego within the city limits a park space of unimproved land to the amount of 1400 acres has been reserved. Going north on the cable-line of street cars to Palm Street and then eastward into the park one comes upon a dry canon at the bottom of which were formerly brick yards. The general level of the land is perhaps about 80 feet above the sea into which this gully or cañon has been carved with various lateral branches. The upper stratum of the hills on either side of the cañon and beneath the thin coating of vegetable mould is a reddish brown sand which varies from four to

ten or more feet in thickness and has been denuded and redeposited in talus on each side of the cañon at the foot of the hilly slopes. On Tenth street which begins at the Park entrance and ascends the hillside on its long (N & S) slope this layer has been cut through, exposing a very good section. Here the sand is distinctly crossbedded and is more or less sprinkled with cobbles and pebbles. The beds dip in a southerly direction about five degrees being a very little arched conformably to the topography. Layers are indicated in the sand by thin deposits of salt or limy matter making some harder and whiter than others and there are occasional limy concretions. At about the base of the sands there is a stratum 1-2 feet thick composed mostly of waterworn and rounded pebbles of schist, red and green porphyry

and syenite or quartzite. These have frequently a whitish coating of lime matter which is sometimes abundant enough to cement the gravel together. Below the gravel bed, at their junction, more or less mixed with it is a layer 1-2' thick of sand and gravel containing broken shells, oysters, pectens, mussels & barnacles, and internal casts of shells (Macoma, Dosinia, Lucinalota) which have not been preserved. Below this are layers in which the same Pliocene species have been retained with others in a tolerably perfect state. On the brow of a spur east of the end of Palmer Street Mr. Hamlin pointed out an outcrop of this kind in which Dosinia ponderosa and two or three species of Pecten were very abundant. A little deeper the specimens are better and the variety greater. Some years

ago Hemphill secured from the material thrown out in digging a well near the mouth of this cañon a large number of species. At this point the Ohes is some 30 feet below the surface. A list was published in the Proc. U.S. Nat Mus.
which indicates a Pliocene age for the beds. A similar deposit occurs on the peninsula opposite San Diego, from which Hemphill also made collections. It is probable that these Pliocene beds underlie a good part of the surface of the city.

La Jolla north of False Bay, San Diego



a bed with Coralliochama

La Jolla near San Diego

Lower bed of sandstone fluish gray, with many broad bands, weathering yellow brown, or reddish from iron oxide but here & there remaining gray - at base cliff. This is massive and uniform without fossils. Towards the top it shows an oyster bed upon which the coarser material including crassitechanus orcutti lies in a layer 18 in to two feet thick. It includes also Ostrea, Lima, Belemnitella, Axinea, Neotrigonia? Mallotia? Terebratella? Spondylus, Q _____, etc. Tellina [illegible]

It dips S 20° W at an angle of 25° to 35° and is conformably overlaid by the shales both. South which alternate hinder sandy & softer clayey layers the former thin the latter thick in. The sandy layers are [illegible]

over a foot thick. The dip
once was to be 4 feet. All is
covered with circular hills
with calc spar cutting the
beds in all directions.
Further to the north the bottom
formation is arched gently
and the dip decides
in the opposite direction.

The strata are gently arched at the point and more or less crumpled S E from it, are denuded to a level above upon which Pliocene or Pleistocene gravels have been deposited.
The sandstone at the end of the pt. has corallicodium the shales above it Inoceramus Belemnites Ammonites etc. at the head of the little bay is a fault & break mostly concealed but S E from it coarse heavy beds of sandstone appear and cover the beach with curiously eroded fragments containing corallicodium

but not the Inocaramus & cephalopods -
Around another little point more faults occur then abrupt cliffs alternating sandstone and shale to which the sea comes up but in which Hamlin has not found Corallichama -

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Near Bird Rock or Island the slates and sandstones dip to the beach making a sort of valley in the strata which is filled with a conglomerate of pebbles cobbles and bowlders cemented together by a hard sandstone. The pebbles are of granite porphyry diorite and quartzite with occasional harder masses of the Chico sandstone with Inocaramus etc.

Pacific Beach near S. Diego.

From just above False Bay the beach is bordered by high bluffs of sand but little indurated. In this sand are layers of Pliocene shells especially Pecten Opalia etc. The Pliocene sands are covered by a layer of gravel with the usual pebbles and Pleistocene sands. The Bluffs extend for half a mile above the hotel, northward from False Bay. At the base of the Pleistocene sands the Pliocene has been denuded, the strata being nearly horizontal, on the denuded Pliocene is deposited a layer of gravel with a large number of Post Pliocene shells above which are gravel sand and

the usual adobe. As we proceed northward the Pliocene layers are more gritty and indurated. They contain many fragments of echini crustaceans & shells which are rather hard and of a yellowish color, while the Pleistocene fossils are chalky & white.

In some places the pleistocene layer is of the usual gray color but elsewhere the hornblende contained in it has decomposed and the oxidation of the iron contained in it has colored the sands red and hardened them.

Point Loma near
San Diego, May 17, 1892

Drive out to the old light house over the ridge forming the point. The superficial layers have been greatly eroded forming amphitheatres with bizarre forms. The strata are composed of more or less indurated sand covered by a thin layer of arable soil. Apparently all of Post Pliocene age. Towards the end of the point the sand comes to the surface and is here compacted into a loose coarse grained sandstone. The sandy layers are of considerable thickness. At the base of the Point the shales and sandstones of the Chico group come out according to Hamlin.

Signal Hill near Long Beach
Los Angeles Co. Cala.

Here at the base of the adobe is a thin bed of scattering pebbles and Pleistocene fossils. Lutricola alta quite numerous, also Olivella biplicata and other recent species. The bed dips with the gravels of which the hill is made up, in various directions and seems not to be over 18 inches thick anywhere and mostly less.
Below it are the alternated sands and gravels so frequently referred to & probably of Pliocene age.

Dead Man's Island at end of San Pedro breakwater. Los Angeles Co. Cal

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This island is peculiar in its makeup being composed (in descending order) of gravel with Pleistocene fossils, of indurated sandstone mostly massive with fossils scattered through it, mostly still living but not in this vicinity at present. This has been referred to the Pliocene. Below this is a bed of claystone which contains a good many fossils but which has been crushed, the fissures filled with silex or limy matter or the fragments aggregated as a breccia in indurated sand of the layer above mentioned. Lastly the lowest bed visible at low water is composed of a rather soft but

compact clay containing many well preserved fossils. This clay is of a bluish cast and contains many fragments of Polyzoons in a fossil state.

The island is evidently a remnant of a former extension of the mainland. The breakwater which connects it with the mainland is made of a sort of porphyrite from Catalina Island.

San Pedro Bluffs.

These are on the opposite side of the harbor from the breakwater and consist of high bluffs mostly of unconsolidated sand which at their upper part carry a thick & prolific bed of Pleistocene fossils including many interesting species